Amendments to the Drawings:

Subject to the approval by the Examiner, please replace drawing sheets labeled FIGURES 11-14, with the attached replacement drawing sheets. The drawings replace the previously submitted informal drawings with formal drawings.

REMARKS

In the Office Action dated April 4, 2006, the Examiner objected to the drawings; rejected claims 11, 37, 38 45 and 52 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement; rejected claims 11, 37, 38, 42, 43, 45, 49, 50 and 52 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite; rejected claims 11 and 37 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 6,785,292 (hereinafter "VOGEL"); rejected claims 39-52 under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent No. 6,940,874 (hereinafter "RUSZCZYK") and rejected claim 38 under 35 U.S.C. §103(a) as allegedly being unpatentable over VOGEL in view of RUSZCZYK.

By way of the present amendment, Applicant amends claim 1 to substantially incorporate the subject matter of dependent claims 37 and 38. Applicant further amends claims 39 and 46 to incorporate the subject matter of dependent claims 40 and 47, respectively. Claims 42, 45, 49 and 52 have been amended to improve form. Claims 37, 38, 40 and 47 have been canceled without prejudice or disclaimer. New claims 53-57 have been added. No new matter has been added by the present amendment. Reconsideration of the outstanding rejection of pending claims 11, 39, 41-46 and 48-52 is respectfully requested in view of the amendments above and the following remarks.

In paragraph 2, the Office Action objects to figures 11-14 as not being "readable." Applicant submits herewith replacement figures 11-14. No new matter has been added. Applicant believes that these replacement figures qualify as formal drawings and are readable. Withdrawal of the object to the drawings is, therefore, respectfully requested.

In paragraph 3, the Office Action rejects claims 11, 37, 38, 45 and 52 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. Specifically, the Office Action asserts that the specification fails to explain "how to convert each of bandwidth allocation requests into a mini-slot size based on a modulation and symbol rate associated with the bandwidth allocation requests." Applicant notes that amended claims 11, 45 and 52 no longer include the language "converting each of the bandwidth requests into a mini-slot size...." and, instead, recite "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request." This feature is disclosed, for example, on page 40, line 20 through page 41, line 5, and Appendix A on page 63, of Applicant's specification. Applicant submits that, in view of this portion of the specification, one skilled in the art would be able to determine a mini-slot size based on a modulation and symbol rate associated with a bandwidth allocation request. Applicant, thus, submits that the specification does sufficiently describe the feature recited in claims 11, 37, 38, 45 and 52 to enable one skilled in the art to make and/or use the invention. Withdrawal of the rejection of claims 11, 37, 38, 45 and 52 is, therefore, respectfully requested.

In paragraph 6, the Office Action rejects claims 11, 37, 38, 42, 43, 45, 49, 50 and 52 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Specifically, with respect to claims 11, 45 and 52, the Office Action asserts that it is not clear what is meant by "converting each of bandwidth allocation requests into a mini-slot size based on a modulation and symbol rate...." As discussed above, these claims have been amended to recite "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request." Applicant believes that this claim language should

obviate the Examiner's objections regarding the previous claim language. Withdrawal of the rejection of claims 11, 37, 38, 45 and 52 under 35 U.S.C. §112, second paragraph, is, therefore, respectfully requested.

With respect to claims 42 and 49, the Office Action asserts that "it is not clear what is meant by 'sending a message on each of the different virtual upstream channels that allocates upstream bandwidth'". Specifically, the Office Action asserts that "it cannot be seen how each channel allocates upstream bandwidth." Claims 42 and 49 have been amended to recite "sending a message, that allocates upstream bandwidth, on each of the different virtual upstream channels," thus, clarifying that the message, and not the channels, allocate upstream bandwidth. In view of these amendments to claims 42 and 49, withdrawal of the rejections of these claims under 35 U.S.C. §112, second paragraph, is respectfully requested.

On page 4, the Office Action rejects claims 11 and 37 under 35 U.S.C. §102(e) as allegedly being anticipated by VOGEL. Claim 11 has been amended to substantially incorporate the subject matter of dependent claims 37 and 38. The rejection of claims 11 and 37 will, therefore, be addressed below with respect to the rejection of claim 38.

On page 5, the Office Action rejects pending claims 39, 41-46 and 48-52 under 35 U.S.C. §102(e) as allegedly being anticipated by RUSZCZYK. Applicants respectfully traverse.

Amended independent claim 39 recites a method that includes "grouping cable modems into a plurality of groups, wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups" and "assigning a

different virtual upstream channel to each of the plurality of groups, wherein each virtual upstream channel is associated with a different modulation, symbol rate or preamble."

A proper rejection under 35 U.S.C. § 102 requires that a reference teach every aspect of the claimed invention. Any feature not explicitly taught must be inherently present. See M.P.E.P. § 2131. RUSZCZYK does not disclose or suggest the combination of features recited in amended claim 1.

For example, RUSZCZYK does not disclose or suggest "grouping cable modems into a plurality of groups, wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups," as recited in amended claim 39. In rejecting claim 40, the features of which have been incorporated into claim 39, the Office Action (pg. 6) asserts that RUSZCZYK discloses "grouping the cable modems into a plurality of groups (column 1, lines 26-29) based on geographic location (latency)." Applicant submits that this section of RUSZCZYK does not suggest or disclose the features as alleged by the Office Action.

At column 1, lines 26-29, RUSZCZYK discloses:

> The physical plant of the data-over-cable system may be divided into physically isolated branches that distribute digital signals from a cable modem termination system ("CMTS") to geographically distinct groups of cable modems.

This section of RUSZCZYK, thus, merely discloses that branches of a cable network may be physically isolated and may distribute signals from a CMTS to geographically distinct groups of cable modems. This section of RUSZCZYK does not explicitly disclose that cable modems are grouped based on a latency associated with each of the groups, as recited in

amended claim 39. In the rejection, the Office Action appears to be alleging that the different geographic locations disclosed in RUSZCZYK inherently discloses that the cable modems are grouped based on a latency associated with each of the groups.

Applicant notes, though, that "in relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). See also M.P.E.P. § 2112. As one skilled in the art will recognize, latency, or the time it takes data to move through a network, is composed of a number of factors including, for example, 1) the length of time it takes data to be sent across a given media (i.e., determined by the speed of the media and the size of the data), 2) the time required by intervening network devices (e.g., routers) to process the data before forwarding the data on to a destination, and 3) the length of time it takes data to travel a distance across the network (i.e., mostly determined by the speed of light and usually not affected by the networking technology in use). As one skilled in the art will further recognize, the geographically distinct groups of cable modems disclosed by RUSZCZYK do not necessarily disclose or imply a different latency between the groups of cable modems. The fact that groups of cable modems may be geographically distinct does not necessarily suggest or imply that the length of time it takes data to be sent across a given media, the time required by intervening network devices to process data, or the length of time it takes data to travel is any different between the cable modems of the different groups. For example, two groups of cable modems can be geographically distinct and still have an identical latency associated with them based on the

factors noted above. Therefore, RUSZCZYK, which discloses that cable modems may be geographically grouped, does not necessarily disclose any relationship between latencies associated with each of the groups. Applicant, thus, submits that RUSZCZYK does not explicitly, or inherently, disclose "wherein the cable modems are grouped into the plurality of groups based on a latency associated with each of the plurality of groups," as recited in amended claim 39.

Since RUSZCZYK does not disclose or suggest the combination of features recited in amended claim 39, Applicant respectfully requests withdrawal of the rejection of claim 39 under 35 U.S.C. § 102.

Claims 41-45 depend from claim 39. These claims, therefore, patentably distinguish over RUSZCZYK for at the reasons set forth above with respect to claim 39. Furthermore, these claims include additional features not suggested or disclosed by RUSZCZYK. For example, claim 41 recites "differentiating slower cable modems from faster cable modems" and "assigning bandwidth to the cable modems based on the differentiation such that the slower cable modems are allowed to transmit data proportionately more frequently than faster cable modems." The Office Action (pg. 6) cites to column 7, lines 43-66 and column 8, lines 49-56 of RUSZCZYK for allegedly disclosing these features.

At column 7, lines 43-66, RUSZCZYK discloses:

> FIG. 3 is a diagram illustrating a preferred structure of a Request message 70. The Request message 70 includes a frame control field 72 ("FC"), a bandwidth request field 74 ("REQ"), a service identifier field 76 ("SID"), and a MAC header check sequence field 78 ("HCS"). Descriptions for the Request message 70 fields are shown in Table 1.

TABLE 1

Request message 70 Parameter	Description
FC 72 Frame control.	Identifies type of MAC message.
REQ 74	Total amount of bandwidth requested in mini-slots.
SID 76	Service Identifier for the cable modem 28 that sent the REQ message.
HCS 78	MAC header check sequence.

The SID 76 is a unique identifier for the cable modem 28 that is requesting permission to transmit. The SID 76 may be assigned by the CMTS 30 when the cable modem 28 initializes and registers with the CMTS 30 as discussed below. The REQ 74 field contains a measure of how much bandwidth, i.e. how many mini-slots, the cable modem 28 requests for the transmission of its data to the CMTS 30.

This section of RUSZCZYK discloses the use of a request message for requesting bandwidth that includes a request parameter REQ 74 that specifies the total amount of bandwidth in mini-slots that a cable modem is requested from the CMTS. Thus, in this section of RUSZCZYK, each cable modem specifically indicates a number of mini-slots requested for upstream transmission. As one skilled in the art will recognize, the number of mini-slots requested by a given cable modem may be based on the amount of data needed to be transmitted, and may not have anything to do with the speed of the cable modem. Therefore, this section of RUSZCZYK does not necessarily disclose, or even suggest, the differentiation of slower cable modems from faster cable modems, as recited in claim 41.

At column 8, lines 49-56, RUSZCZYK discloses:

> The MAP message 80 informs the cable modems 28 of the allocation of mini-slots for a scheduled upstream usage interval and when to begin the usage interval. In a given upstream usage interval, selections of the cable modems 28 alternately transmit on the upstream channel. As is known in the art, each upstream usage interval is composed of transmission intervals, also referred to as "bursts," which comprise at least one mini-slot.

This section of RUSZCZYK merely discloses the use of a MAP message for informing the cable modems of the allocation of mini-slots. This section of RUSZCZYK does not suggest or disclose the differentiation of slower cable modems from faster cable modems, as recited in claim 41.

In view of the remarks above, Applicant submits that RUSZCZYK does not disclose the combination of features recited in claim 41. Withdrawal of the rejection of this claim is, therefore, respectfully requested.

As another example, amended claim 45 recites "receiving bandwidth requests from multiple ones of the cable modems" "for each of the bandwidth requests, determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned" and "scheduling transmission on a physical channel from cable modems associated with each of the bandwidth requests based on a respective mini-slot size." The Office Action (pg. 7) cites to column 7, lines 28-36 and column 9, lines 44-51 of RUSZCZYK for allegedly disclosing these features.

At column 7, lines 28-36, RUSZCZYK discloses:

> A cable modem 28 typically transmits on an upstream channel during a transmission mini-slot allocated by the CMTS 30. The upstream channel may be viewed as time-divided into a stream of mini-slots, each of which is a unit of granularity for upstream transmission opportunities. The CMTS 30 also times the mini-slots to prevent collisions between the transmissions from different cable modems by instructing the cable modems 28 to transmit alternately during the mini-slots.

This section of RUSZCZYK merely discloses the transmission of data, from a cable modem, on an upstream mini-slot allocated by a CMTS. This section, however, does not disclose, or have anything to do with, the determination of a mini-slot size. This section of RUSZCZYK, thus, does not disclose, or even suggest, "determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned," as recited in amended claim 45.

At column 9, lines 44-51, RUSZCZYK discloses:

> Additionally, the cable modem 28 may transmit data packets in adjacent mini-slots according to different transmission formats for the RF interface 52. Associated with the formats are parameters for data transmission. In one exemplary preferred embodiment of the present invention, the parameters for upstream data transmission include the symbol rate, the upstream channel frequency, the modulation type, the preamble, and Forward Error Correction ("FEC") parameters as described in Table 3.

This section of RUSZCZYK discloses the transmission of data in adjacent mini-slots with different transmission formats. This section of RUSZCZYK, however, does not disclose, or have anything to do with, determining a mini-slot size and, thus, does not disclose "determining a mini-slot size based on the modulation and symbol rate of the virtual upstream channel to which a respective cable modem is assigned," as recited in amended claim 45. In view of the remarks above, Applicant submits that RUSZCZYK does not disclose the combination of features recited in amended claim 45. Withdrawal of the rejection of this claim is, therefore, respectfully requested.

Amended independent claim 46, though of different scope than claim 39, recites substantially similar features to those discussed above with respect to claim 39.

Amended claim 46, therefore, patentably distinguishes over RUSZCZYK for at least reasons similar to reasons set forth above with respect to claim 39.

Claims 48-52 depend from claim 46 and, therefore, patentably distinguish over RUSZCZYK for at least the reasons applicable to claim 46. Claims 48 and 52 further recite similar features to those discussed above with respect to claims 41 and 45, respectively. Claims 48 and 52, therefore, patentably distinguish over RUSZCZYK for at least the additional reasons set forth above with respect to claims 41 and 45, respectively.

On page 8, the Office Action rejects claim 38 under 35 U.S.C. §103(a) as allegedly being unpatentable over VOGEL in view of RUSZCZYK. Applicant respectfully traverses.

Amended independent claim 11 (which has been amended to incorporate the subject matter of claims 37 and 38) recites a "method of scheduling cable modems in a broadband communications system" that includes "receiving bandwidth allocation requests from the cable modems," "for each of the bandwidth allocation requests, determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request," "scheduling transmission on a physical upstream channel from cable modems associated with each of the bandwidth allocation requests based on a respective mini-slot," "segregating the physical upstream channel into multiple virtual upstream channels, wherein each of the multiple virtual upstream channels is associated with a different modulation and symbol rate," "grouping the cable modems into a plurality of groups" and "assigning a different one of the multiple virtual upstream channels to each of the plurality of groups for

upstream transmission." VOGEL and RUSZCZYK, whether taken alone or in any reasonable combination, do not disclose or suggest this combination of features.

For example, VOGEL and RUSZCZYK do not disclose or suggest "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request" or "assigning a different one of the multiple virtual upstream channels to each of the plurality of groups for upstream transmission," as recited in amended claim 11. In rejecting claims 11 and 38, the Office Action (pg. 5) cites to column 7, lines 28-36 and column 9, lines 20-26 of VOGEL for allegedly disclosing various features of the claims.

At column 7, lines 28-36, VOGEL discloses:

> A CM 28 is permitted to transmit on an upstream channel during a transmission mini-slot allocated by the CMTS 30. When a CM 28 wishes to transmit data it must first request permission from the CMTS 30. The CMTS 30 receives requests from a selection of cable modems that wish to transmit and may allocate one or more transmission mini-slots to each of the cable modems. The cable modems alternately transmit during the mini-slots. Mini-slots are timed to prevent collisions between the transmissions from different cable modems.

This section of VOGEL discloses the allocation of mini-slots to a requesting cable modem based on a request message sent from the cable modem. This section of VOGEL does not disclose, or have anything to do with, the determination of a mini-slot size based on a modulation and symbol rate associated with a bandwidth allocation request, as recited in amended claim 11.

At column 9, lines 20-26, VOGEL discloses:

> Additionally, data packets that are transmitted in adjacent mini-slots may be transmitted according to different transmission formats for the RF interface 52. The formats are associated with parameters for data transmission. In one exemplary preferred embodiment of the present invention, the parameters for upstream data transmission include the symbol rate, the upstream channel

> frequency, the modulation type, the preamble, and Forward Error Correction ("FEC") parameters as described in Table 3.

This section of VOGEL discloses the transmission of data in adjacent mini-slots with different transmission formats. This section of VOGEL, however, does not disclose, or have anything to do with, determining a mini-slot size and, thus, does not disclose "determining a mini-slot size based on a modulation and symbol rate associated with a respective bandwidth allocation request," as recited in amended claim 11.

On page 8, the Office Action further asserts that VOGEL discloses "allocating one or more transmission mini-slots to each of the cable modems" but admits that VOGEL fails to disclose "grouping the cable modems into a plurality of groups." The Office Action cites to column 1, lines 26-29 of RUSZCZYK for allegedly disclosing grouping the cable modems into a plurality of groups. The Office Action further alleges that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Vogel to segregate number of cable modems into a plurality of groups so that different upstream transmission parameters would be assigned to each cable modem to provide better quality of service to customers."

As noted above, column 1, lines 26-29 of RUSZCZYK merely discloses that branches of a cable network may be physically isolated and may distribute signals from a CMTS to geographically distinct groups of cable modems. Neither this section of RUSZCZYK, nor the Office Action's allegation of obviousness, discloses "assigning a different one of the multiple virtual upstream channels to each of the plurality of groups for upstream transmission," as recited in amended claim 11. Even

if, for the sake of argument, one accepts the Office Action's allegation that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Vogel to segregate number of cable modems into a plurality of groups so that different upstream transmission parameters would be assigned to each cable modem to provide better quality of service to customers," Applicant notes that this allegation does not "teach" that a different one of the multiple virtual upstream channels is assigned to each of the plurality of groups for upstream transmission, as recited in amended claim 11.

In view of the remarks above, Applicant submits that VOGEL and RUSZCZYK, whether taken alone or in any reasonable combination, do not disclose or suggest the combination of features recited in amended claim 11. Withdrawal of the rejection of this claim is, therefore, respectfully requested.

New claims 53-56 recite a method that includes "grouping cable modems into different groups based on latencies associated with the cable modems" and "allocating bandwidth request opportunities to each of the different groups of cable modems based on the different latencies associated with each of the groups." Applicant submits that VOGEL and RUSZCZYK, either singly or in any reasonable combination, do not disclose or suggest this combination of features. Applicant, therefore, respectfully submits that new claims 53-56 patentably distinguish over the cited references.

New claim 57 recites a method that includes "differentiating slower cable modems from faster cable modems in a cable network" and "assigning upstream bandwidth to the cable modems based on the differentiation such that the slower cable

modems are allowed to transmit data on the upstream proportionately more frequently than faster cable modems." This claim, thus, recites similar features to those discussed above with respect to claim 41. This claim, therefore, patentably distinguishes over the cited references for at least the reasons set forth above with respect to claim 41.

In view of the foregoing amendments and remarks, Applicant respectfully requests the Examiner's reconsideration of this application, and the timely allowance of the pending claims. If any questions remain, the Examiner is invited to contact the undersigned at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

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